

# PSI-WL-RS232-RS485/BT/...



## PSI Bluetooth converter

Data sheet  
104621\_en\_04

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### 1 Description

The **PSI-WL-RS232-RS485/BT/2DO** PSI Bluetooth converter provides a quick and easy wireless connection between serial interfaces of the RS-232, RS-422, and RS-485 2-wire standard. Data links can be established to third-party devices or the **PSI-WL-PLUG-RS232/BT** Bluetooth RS-232 adapter. Programming or diagnostic access to controllers or a wireless master/slave network can easily be implemented in fieldbus systems regardless of the location.

The PSI Bluetooth converter has been specially designed to meet the requirements of industrial environments and supports operation without software drivers, thanks to its fully integrated protocol stacks.

The wireless connection can extend up to 150 meters and is based on the international, license-free Bluetooth standard. This wireless standard meets high requirements for interference-free data transmission, in particular through the use of the frequency hopping method (FHSS) with the 2.4 GHz ISM band.

#### Features

- Supply of 24 V DC or AC
- Transmission speed can be set up to 187.5 kbps
- Either RS-232, RS-422 or RS-485
- Supports all popular 10/11-bit UART data formats
- 3964R-compatible
- External antenna connection for optimum antenna positioning
- Bluetooth access protected by password, fixed device pairing or device access list
- Scalable transmission power for specific, spatial containment of the wireless cell
- Integrated Bluetooth path diagnostics via LED bar graph
- Two digital diagnostic outputs (**not** in the case of the PSI-WL-RS232-RS485/BT/HL product version)
- R&TTE device class: Class 2
- Bluetooth device class: Class 1, 14 dBm
- 79 channels, bandwidth: 79 MHz



#### NOTE: device damage

The device is only intended for operation in the control cabinet and with SELV according to IEC 60950/EN 60950/VDE 0805. The device may only be connected to devices, which meet the requirements of EN 60950.



Make sure you always use the latest documentation.  
It can be downloaded from the product at [phoenixcontact.net/products](http://phoenixcontact.net/products).



This data sheet is valid for all products listed on the following page:

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### 3 Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Bluetooth converter, wireless transmission: V.24 (RS-232)/RS-422/RS-485 2-wire, mounting on EN DIN rails, MCX connection for external antenna, integrated path diagnostics: bar graph + two digital outputs, cross-wiring of 24 V DC and RS-485 2-wire	PSI-WL-RS232-RS485/BT/2DO	2313805	1
Bluetooth PROFIBUS SET, pre-configured: PROFIBUS point-to-point, PROFIBUS baud rate: 187.5 kbps, integrated path diagnostics: bar graph + two digital outputs, cross-wiring of 24 V DC and RS-485 2-wire, contents: 2 x Bluetooth converter + 2 x antenna	PSI-WL-PROFIB/BT-SET/2DO	2313876	1
Bluetooth converter, wireless transmission: RS-232/422/485 2-wire, mounting on EN DIN rails, MCX connection for external antenna, integrated path diagnostics: bar graph, cross-wiring of 24 V DC and RS-485 2-wire, UL-HazLoc approval	PSI-WL-RS232-RS485/BT/HL	2313795	1
Accessories	Type	Order No.	Pcs. / Pkt.
RS-232 cable, 9-pos. D-SUB socket on 9-pos. D-SUB socket, 9-wire, 1:1	PSM-KA9SUB9/BB/0,5METER	2708520	1
RS-232 cable, 9-pos. D-SUB socket on 9-pos. D-SUB socket, 9-wire, 1:1	PSM-KA9SUB9/BB/2METER	2799474	1
D-SUB plug, 9-pos. female connector, one cable entry < 35°, universal type for all systems, pin assignment: 1, 2, 3, 4, 5, 6, 7, 8, 9 to screw connection terminal block	SUBCON 9/F-SH	2761499	1
V.24 (RS-232) zero modem connector	PSM-AD-D9-NULLMODEM	2708753	1
USB 2.0 cable, USB A male plug to mini-USB B male plug, length: 1 m	PSI-CA-USB A/MINI B/1METER	2313575	1
USB connecting cable: USB plug type A to USB plug type Mini-B; length: 3 m	CABLE-USB/MINI-USB-3,0M	2986135	1
Connecting cable D-9-SUB to USB, with adapter D-9-SUB to D-25-SUB.	CM-KBL-RS232/USB	2881078	1
RS-232 cable, 9-pos. D-SUB socket 25-pos on D-SUB socket	PSM-KA 9 SUB 25/BB/2METER	2761059	1
Adapter cable to connect the IB IL RS232 and IB IL RS232-PRO Inline communication terminals to the interface converter, e.g. modem, Com server, Bluetooth or fiber optics.	PSM-KAD-IL RS232/9SUB/B/0,8M	2319200	1
DIN rail connector for DIN rail mounting. Universal for TBUS housing. Gold-plated contacts, 5-pos. Header, Nominal current: 8 A, Articles with gold-plated contacts, bus connectors for connecting with electronic housings	ME 17,5 TBUS 1,5/ 5-ST-3,81 GN	2709561	10
DIN rail connector for DIN rail mounting. Universal for TBUS housing. Gold-plated contacts, 5-pos. Header, Nominal current: 8 A, Pitch: 3.81 mm, Articles with gold-plated contacts, bus connectors for connecting with electronic housings	ME 22,5 TBUS 1,5/ 5-ST-3,81 GN	2707437	50
DIN rail power supply unit, primary-switched mode, slim design, output: 24 V DC / 1.5 A	MINI-SYS-PS-100-240AC/24DC/1.5	2866983	1
Omnidirectional antenna, 2.4 GHz, 2 dBi, linear vertical, 1.5 m cable, MCX (male), IP65, 50 Ω impedance	RAD-ISM-2400-ANT-OMNI-2-1	2867461	1
Bluetooth-USB adapter for direct assembly on USB type A ports and wireless transmission from USB interfaces	PSI-WL-PLUG-USB/BT	2313083	1
Omnidirectional antenna with protection against vandalism, 2.4 GHz, 3 dBi gain, IP55 protection, 1.5 m cable length, MCX (male) connection, opening angle h/v 360°/85°. Appropriate mounting material is available for wall mounting.	RAD-ISM-2400-ANT-VAN- 3-1-MCX	2885702	1
Omnidirectional antenna, 2.4 GHz, 6 dBi, linear vertical, N (female), IP55, 50 Ohm impedance	RAD-ISM-2400-ANT-OMNI-6-0	2885919	1
Omnidirectional antenna, 2.4 GHz, 6 dBi, linear vertical, opening angle h/v 360°/20°, N (female), IP65, salt water resistant	RAD-2400-ANT-OMNI-6-0-SW	2903219	1
Panel antenna, 2.4/5 GHz, 9 dBi, linear vertical, N (female), IP67, incl. mounting bracket and mast clips for 25 - 85 mm diameter, stainless steel	ANT-DIR-2459-01	2701186	1

Accessories	Type	Order No.	Pcs. / Pkt.
Panel antenna, degree of protection IP55, 8 dBi gain, linear vertical, SMA (female), impedance 50 ohms, apex angle h/v 75°/70°	RAD-ISM-2400-ANT-PAN- 8-0	2867610	1
Antenna cable, 3 m in length; SMA (male) -> SMA (male), attenuation approx. 0.93 dB at 2.4 GHz; impedance 50 ohms	RAD-CAB-EF142-3M	2884512	1
Antenna cable, 5 m in length; SMA (male) -> SMA (male), attenuation approx. 0.93 dB at 2.4 GHz; impedance 50 ohms	RAD-CAB-EF142-5M	2884525	1
Antenna cable, 3 m in length; N (male) -> N (male), attenuation approx. 0.45 dB/m at 2.4 GHz; impedance 50 ohms	RAD-CAB-EF393- 3M	2867649	1
Antenna cable, 5 m in length; N (male) -> N (male), attenuation approx. 0.45 dB/m at 2.4 GHz; impedance 50 ohms	RAD-CAB-EF393- 5M	2867652	1
Antenna cable, 10 m in length; N (male) -> N (male), attenuation approx. 0.45 dB/m at 2.4 GHz; impedance 50 ohms	RAD-CAB-EF393-10M	2867665	1
Antenna extension cable, 15 m long; N (male) -> N (male), attenuation approx. 0.45 dB/m at 2.4 GHz; impedance 50 Ω	RAD-CAB-EF393-15M	2885634	1
Vulcanizing sealing tape for external protection of adapters, cable connections, etc. against the effects of weather, roll length: 3 m	RAD-TAPE-SV-19-3	2903182	1
Adapter cable, pigtail 100 cm MCX (male) -> SMA (male), insertion attenuation 1.5 dB at 2.4 GHz; impedance 50 ohms	RAD-PIG-EF316-MCX-SMA	2867678	1
Adapter cable, pigtail 50 cm MCX (male) -> N (male), insertion attenuation 1.5 dB at 2.4 GHz; impedance 50 ohms	RAD-PIG-EF316-MCX-N	2867681	1
Adapter cable, pigtail 30 cm N (female) -> SMA (male), insertion attenuation 1.5 dB at 2.4 GHz; impedance 50 ohms	RAD-PIG-EF316-N-SMA	2867694	1
Adapter cable, pigtail 50 cm N (male) -> N (female), insertion attenuation 1.5 dB at 2.4 GHz; impedance 50 ohms	RAD-PIG-EF316-N-N	2867704	1
Attachment plug with Lambda/4 technology as surge protection for coaxial signal interfaces. Connection: N connectors socket-socket	CN-LAMBDA/4-5.9-BB	2838490	1
Adapter, SMA (female) -> SMA (female); insertion attenuation <0.3 dB at 2.4 GHz	RAD-ADP-SMA/F-SMA/F	2884541	1
Adapter, N (male) -> SMA (female); insertion attenuation <0.3 dB at 2.4 GHz	RAD-ADP-N/M-SMA/F	2917036	1

## 4 Technical data

### Supply

Supply voltage range	10 V DC ... 30 V DC (via pluggable COMBICON screw terminal block) 19 V AC ... 29 V AC (50/60 Hz)
Nominal supply voltage	24 V DC $\pm 20\%$ (as an alternative or redundant, via backplane bus contact and system current supply)
Typical current consumption	$\leq 100$ mA (24 V DC)
Electrical isolation	VCC // Bluetooth, RS-232, RS-422, RS-485, USB
Test voltage data interface/power supply	1.5 kV AC (50 Hz, 1 min.)

### V.24 (RS-232) interface in acc. with ITU-T V.28, EIA/TIA-232, DIN 66259-1

Connection method	D-SUB-9 plug
Data format/encoding	Serial asynchronous UART/NRZ, 8 data, 1/2 stop, 1 parity, 10/11-bit character length
Serial transmission speed	1.2; 2.4; 4.8; 7.2; 9.6; 19.2; 31.25; 38.4; 57.6; 75; 93.75; 115.2 kbps
Transmission length	$\leq 15$ m
Data flow control/protocols	Software handshake, Xon/Xoff, or hardware handshake RTS/CTS, 3964 compatible
Pin assignment	DCE (Data Communication Equipment)



The RS-232 interface and the USB interface cannot be used simultaneously.

### RS-422 interface in acc. with ITU-T V.11, EIA/TIA-422, DIN 66348-1

Connection method	Pluggable screw connection
Data format/encoding	Serial asynchronous UART/NRZ, 8 data, 1/2 stop, 1 parity, 10/11-bit character length
Termination resistor	390 $\Omega$ - 180 $\Omega$ - 390 $\Omega$ configurable
Serial transmission speed	1.2; 2.4; 4.8; 7.2; 9.6; 19.2; 31.25; 38.4; 57.6; 75; 93.75; 115.2; 136; 187.5 kbps
Transmission length	$\leq 1200$ m
Data flow control/protocols	Automatic control

### RS-485 interface, in acc. with EIA/TIA-485, DIN 66259-4/RS-485 2-wire

Connection method	Pluggable screw connection
Data format/encoding	Serial asynchronous UART/NRZ, 8 data, 1/2 stop, 1 parity, 10/11-bit character length
Termination resistor	390 $\Omega$ - 180 $\Omega$ - 390 $\Omega$ configurable
Serial transmission speed	1.2; 2.4; 4.8; 7.2; 9.6; 19.2; 31.25; 38.4; 57.6; 75; 93.75; 115.2; 136; 187.5 kbps
Transmission length	$\leq 1200$ m
Data flow control/protocols	Automatic control

### USB 2.0

Connection method	Mini-USB B, socket
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**Wireless interface**

Interface description	Bluetooth 2.1 + EDR
Frequency range	2.402 GHz ... 2.48 GHz (ISM bandwidth)
Antenna	External
Connection method	MCX socket
Channel distance	1 MHz
Transmission method	1.6 kHz (FHSS)
Transmit capacity, minimum	-28 dBm (can be set via software)
Transmit capacity, maximum	14 dBm (can be set via software)
Range	≤ 150 m (14 dBm)
Minimum receiver sensitivity	-91 dBm
Bluetooth Multidrop master/slave	1/7
Operating mode	GAP: Generic Access Profile (Method for authentication and connection establishment) SDAP: Service Discovery Application (Method for requesting supported services) SPP: Serial Port Profile (COM port emulation method) DUN: Dial-Up Networking Profile (Modem dialing method) LAP: LAN Access Point Profile (Network connection method)

**General data**

Degree of protection	IP20
Dimensions (W/H/D)	22.5 mm x 99 mm x 116 mm
Weight	120 g
Housing material	PA 6.6-FR green
Free fall in acc. with IEC 60068-2-32	1 m
Vibration resistance in acc. with EN 60068-2-6/IEC 60068-2-6	5 g, 150 Hz, 2.5 h, in XYZ direction
Shock in acc. with EN 60068-2-27/IEC 60068-2-27	15 g, 11 ms period, half-sine shock pulse
MTTF (mean time to failure) SN 29500 standard, temperature 25°C, operating cycle 21 % (5 days a week, 8 hours a day)	2115 Years
MTTF (mean time to failure) SN 29500 standard, temperature 40 °C, operating cycle 34.25 % (5 days a week, 12 hours a day)	850 Years
MTTF (mean time to failure) SN 29500 standard, temperature 40°C, operating cycle 100 % (7 days a week, 24 hours a day)	346 Years
Noise emission according to	EN 55011
Noise immunity according to	EN 61000-6-2:2005
Electromagnetic compatibility	Conformance with R&TTE directive 1999/5/EC

**Ambient conditions**

Ambient temperature (operation)	-20 °C ... 60 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Permissible humidity (operation)	10 % ... 95 % (non-condensing)
Permissible humidity (storage/transport)	5 % ... 95 % (non-condensing)

**Certification / Approvals**

Conformance	CE-compliant
Free from substances that could impair the application of coating	according to P-VW 3.10.7 57 65 0 VW-AUDI-Seat central standard
UL, USA / Canada	cULus listed UL 508
Standards/regulations	FCC Part 15.247 / ISC RSS 210

**Conformance with R&TTE directive 1999/5/EC****Noise immunity according to EN 61000-6-2**

Electrostatic discharge	EN 61000-4-2	
	Contact discharge	± 6 kV
	Discharge in air	± 8 kV
	Comments	Criterion B
Electromagnetic HF field	EN 61000-4-3	
	Frequency range	80 MHz ... 3 GHz
	Field intensity	10 V/m
	Comments	Criterion A
Fast transients (burst)	EN 61000-4-4	
	Input	± 2 kV
	Signal	± 2 kV
	Comments	Criterion B
Surge current loads (surge)	EN 61000-4-5	
	Input	± 2 kV
	Signal	± 1 kV
	Comments	Criterion B
Conducted interference	EN 61000-4-6	
	Voltage	10 V
	Comments	Criterion A

**Emitted interference in acc. with EN 61000-6-4**

Noise emission EN 55022

Criterion A Normal operating behavior within the specified limits  
 Criterion B Temporary impairment of operating behavior that is corrected by the device itself

**R&TTE Directive 1999/5/EC**

EMC - immunity to interference (electromagnetic compatibility of wireless systems)	EN 61000-6-2	Generic standard for the industrial sector
Safety - protection of personnel with regard to electrical safety	EN 60950-1	
Health - limitation of exposure of the population to electromagnetic fields	EC Gazette 1999/519/EC	EC Council recommendation of July 12, 1999
Radio - effective use of the frequency spectrum and prevention of radio interference	ETSI EN 300328: V1.4.1, V1.2.1	

## 4.1 Configuration

### Configuration

System requirements	Windows operating system, Windows XP or later
Configuration interface	USB, RS-232 or Bluetooth



Configure the device with the configuration software in CONF mode via the RS-232 or USB interface. Either configure the directly connected device or the device that is connected via Bluetooth.

Delivery state: 9.6 kbps, no parity, 1 stop bit, hardware handshake

The PSI-CONF configuration software and further information can be found at [phoenixcontact.net/products](http://phoenixcontact.net/products).

## 4.2 Dimensions

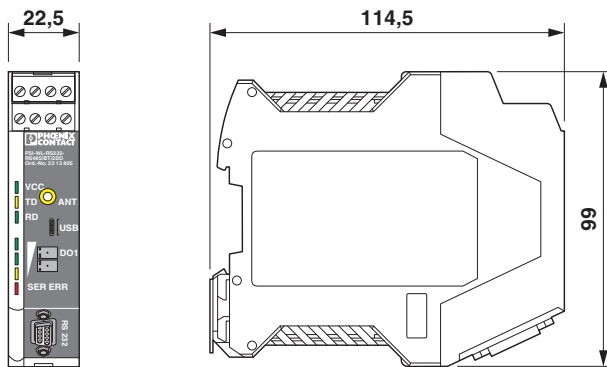


Figure 1 Dimensions



## 5 Safety and warning notes



### WARNING:

Observe the following safety notes when using the device.

Only qualified specialists staff may install, set up and operate the device. Observe the national safety rules and regulations for the prevention of accidents.

- Installation should be carried out according to the instructions provided in the operating instructions. Access to circuits within the device is not permitted.
- The device does not require maintenance. Repairs may only be carried out by the manufacturer.
- The device is only intended for operation in the control cabinet and with SELV according to IEC 60950/EN 60950/VDE 0805. The device may only be connected to devices, which meet the requirements of EN 60950.

This device is licensed for operation with a maximum transmission power of 100 mW (20 dBm) in the following countries:

Belgium, Bulgaria, Denmark, Germany, Estonia, France, Finland, Greece, Great Britain, Italy, Ireland, Iceland, Liechtenstein, Luxembourg, Latvia, Lithuania, Malta, Netherlands, Norway, Austria, Poland, Portugal, Romania, Sweden, Switzerland, Slovakia, Slovenia, Spain, Czech

Republic, Turkey\*, Hungary, Belarus\*, Cyprus (other national certifications on request).

\*This device complies with R&TTE device class 2, with the following restrictions on use according to the ERC recommendation 70-03 / April 2004:

Belarus	Maximum transmission power of 25 mW (14 dBm) outside of buildings
Norway	The device must not be operated within 20 km of the Ny Ålesund town center.
Turkey	The device must only be operated with Phoenix Contact antennas (see wireless accessories data sheet, Order No. 101580) - according to the regulations in Gazette "Short Range Radio Devices (SRD) Regulations" no. 26464 dated 16/03/2007.

Operation of the wireless system is only permitted only when using accessories available from Phoenix Contact. The use of any other components can lead to the withdrawal of the operating license.

Please observe that the maximum permissible transmission power of the device can be exceeded in combination with antennas.

- RAD-ISM-2400-ANT-PAN-8-0 and ANT-DIR-2459-01: set the transmission power via the software.  
Hungary: this combination may not be used!

### 5.1 UL note (only for PSI-WL-RS232-RS485/BT/2DO and PSI-WL-PROFIB/BT-SET/2DO)



Wire Range: 30-12 AWG

Torque: 5-7 (Lbs-In)

"Maximum Ambient Temperature 60°C"

Environmental designation: "Open Type Device"

## 5.2 UL note (only for PSI-WL-RS232-RS485/BT/HL with HazLoc approval)



**WARNING: Explosion hazard when used in potentially explosive areas**

Use the digital outputs DO1 and DO2 within the safe area only. They are **not** suitable for use in a potentially explosive area.

**INDUSTRIAL CONTROL EQUIPMENT 11AE**

10 ... 30 V DC <170 mA, 24 V AC  $\pm$ 20 % <110 mA,  
Class 2

Wire Range: 30-12 AWG

Torque: 5-7 (Lbs-In)

Maximum Ambient Temperature 60°C

Environmental designation: "Open Type Device"

**PROCESS CONTROL EQUIPMENT FOR HAZARDOUS LOCATIONS 31ZN**

- A This equipment is suitable for use in Class I, Zone 2, AEx nA IIC T6; Class I, Zone 2, Ex nA IIC T6 Gc X and Class I, Division 2, Groups A, B, C, D or non-hazardous locations only.
- B Conductor temperature rating must be 65°C or higher.
- C Product must be installed in Class I, Zone 2 certified and at least an IP54 enclosure.
- D Product must be used in no more than a pollution degree 2 environment as defined by IEC 60664-1.
- E Provisions must be made to provide transient protection to the product so that voltage levels do not exceed 40 % of the rated voltage at the power supply terminals.
- F The product has to be installed in an enclosure with tool removable cover or door.

Ambient temperature: -20°C ... +60°C

24 V AC <100 mA, 24 V DC <170 mA

Wire Range: 30-12 AWG

Torque: 5-7 (Lbs-In)

## 6 Structure

### 6.1 Function elements

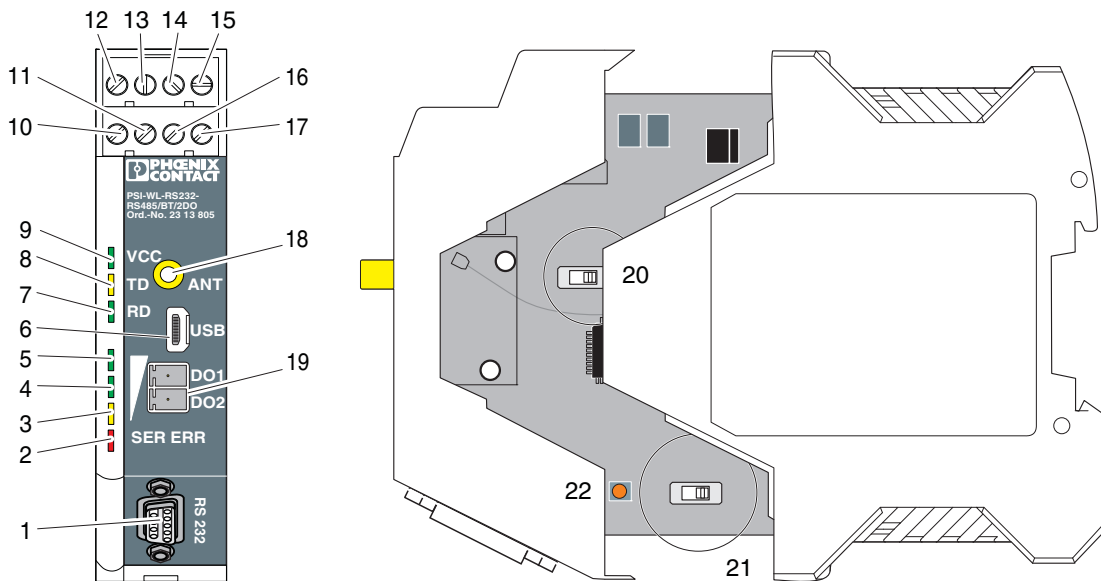


Figure 2 Function elements

- |         |  |
|---------|--|
| 1       | D-SUB9: RS-232 interface (pin strip)   |
| 2       | Red LED, SER ERR, flashes in the event of any serial error, e.g., parity, transmission speed |
| 3 ... 5 | LED bar graph  |
| 6       | Mini-USB type B: USB interface   |
| 7       | Green LED, RD, receive data  |
| 8       | Yellow LED, TD, transmit data  |
| 9       | Green LED, VCC   |
| 10      | Shield connection, same potential as FE  |
| 11      | GND  |
| 12      | 24 V 24 V DC supply voltage  |
| 13      | 0 V 0 V DC supply voltage  |
| 14      | T(A) RS-422 connection, negative   |
| 15      | T(B) RS-422 connection, positive   |
| 16      | D(A) RS-422/485 connection, negative   |
| 17      | D(B) RS-422/485 connection, positive   |
| 18      | Antenna connection (MCX socket)  |
| 19      | DO1, DO2 Digital output of the wireless signal strength (only for use in safe areas)         |
| 20      | Slide switch for RS-422/485 termination network  |
| 21      | CONF / RUN slide switch  |
| 22      | Reset button   |

### 6.2 Diagnostics and status indicators

A 3-stage LED bar graph displays the wireless reception quality during operation.

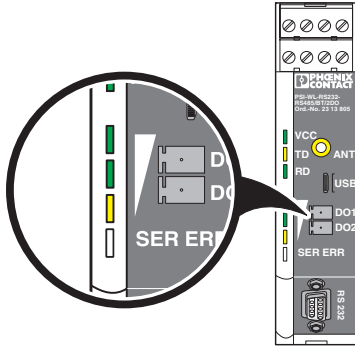


Figure 3 Diagnostics indicators in normal operation

Bar graph	LEDs	Receive signal	DO 1	DO 2
	All LEDs light up	Wireless signal very good	1	1
	Yellow and 1 green LEDs light up	Wireless signal good	1	0
	Yellow LED lights up	Wireless signal available	0	1
	OFF	Not connected	0	0

### 6.3 Digital diagnostic outputs

**Note for the PSI-WL-RS232-RS485/BT/HL product version with HazLoc approval:**



**WARNING: Explosion hazard when used in potentially explosive areas**

Use the digital outputs DO1 and DO2 within the safe area only. They are **not** suitable for use in a potentially explosive area.

In addition, the current signal quality can be read via digital outputs DO1/DO2. A coded status of the bar graph LEDs is output here and can be processed externally. The 24 V supply voltage is output via an optocoupler with a maximum current carrying capacity of 120 mA.

Diagnostic outputs	
Connection	MINI COMBICON connector, 2-pos., maximum 1.5 mm <sup>2</sup>
Function	Digital output of current Bluetooth receive quality, output of the supply voltage via optocoupler
Maximum current carrying capacity	120 mA
Separate potential levels	VCC // Logic
Test voltage	1.5 kV AC, 50 Hz, 1 minute between all potential levels according to EN 50178 and EN 61131-2



Only for PSI-WL-RS232-RS485/BT/**2DO** and PSI-WL-PROFIB/BT-SET/**2DO**:

A 2-pos. MINI COMBICON connector (Order No. 1803578) for outputs DO1/DO2 is supplied as standard.